Tok Electromagnetic and Magnetic Airborne Geophysical Survey Data Compilation

State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and CGG

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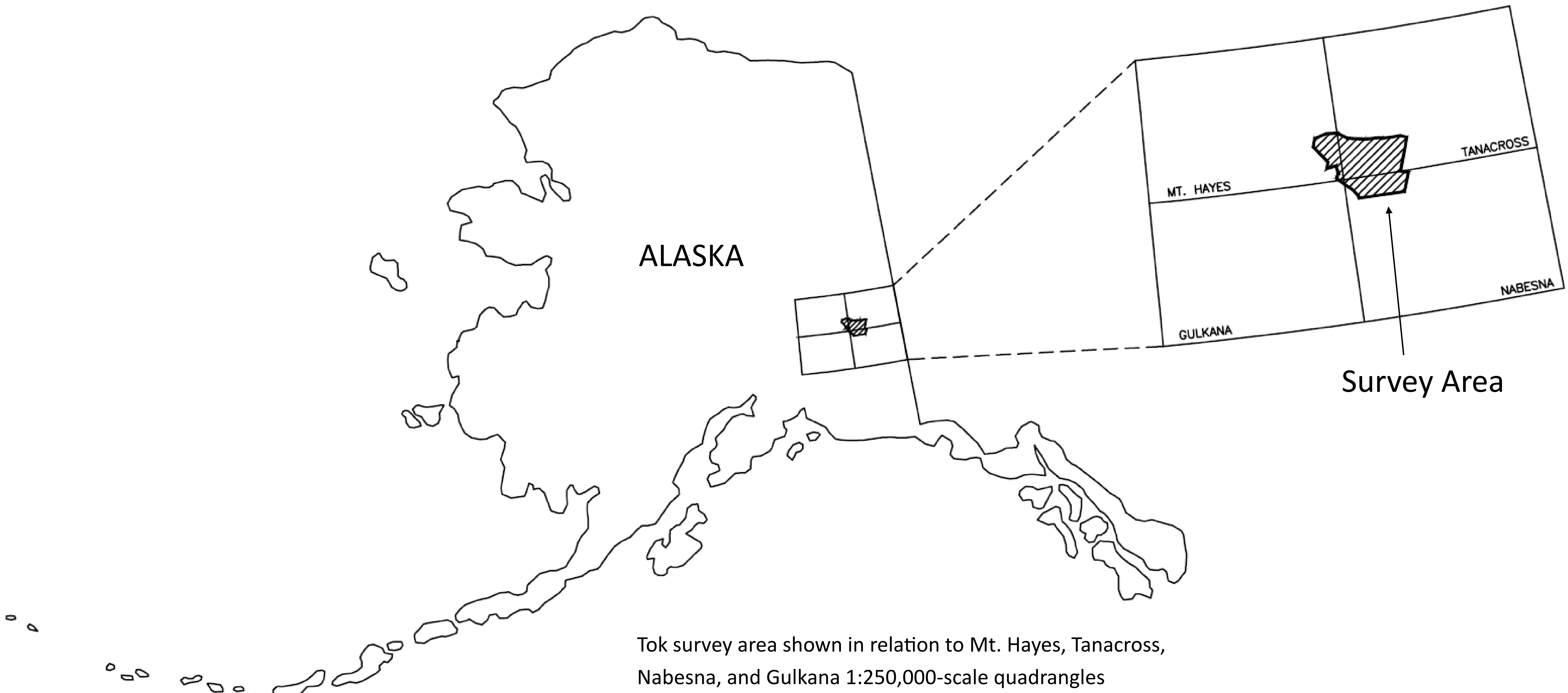
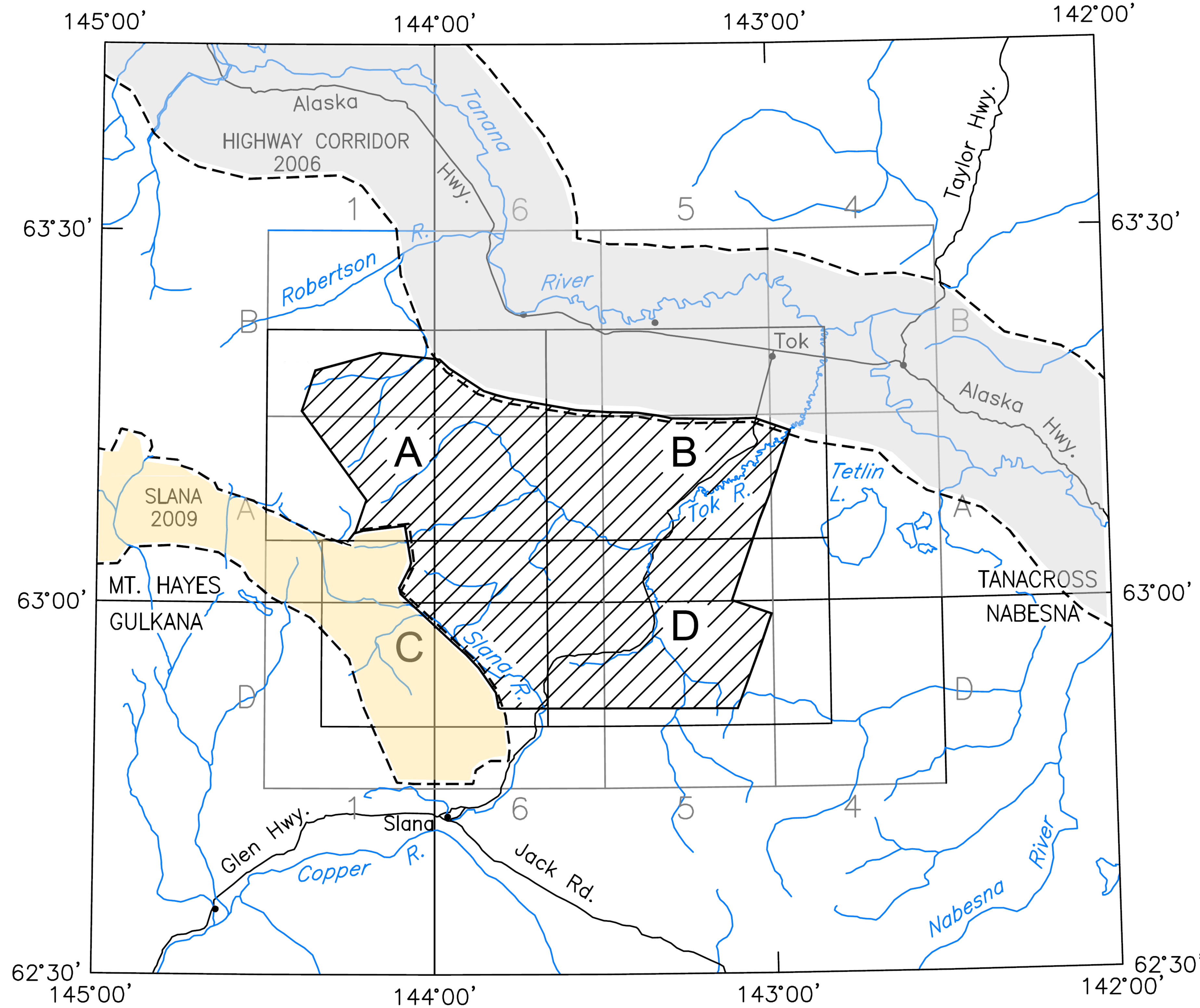
Survey Overview



Tok survey area shown in relation to Mt. Hayes, Tanacross, Nabesna, and Gulkana 1:250,000-scale quadrangles

Tok survey 1:63,360-scale map sheet index showing survey area (hatched), prior surveys (outlined by long dashes), highways, towns, rivers, relevant 1:250,000 quadrangle boundaries (solid black lines), relevant 1:63,360 quadrangle boundaries (light grey grid with alphanumeric labels), and showing the map sheets A–D (black grid).



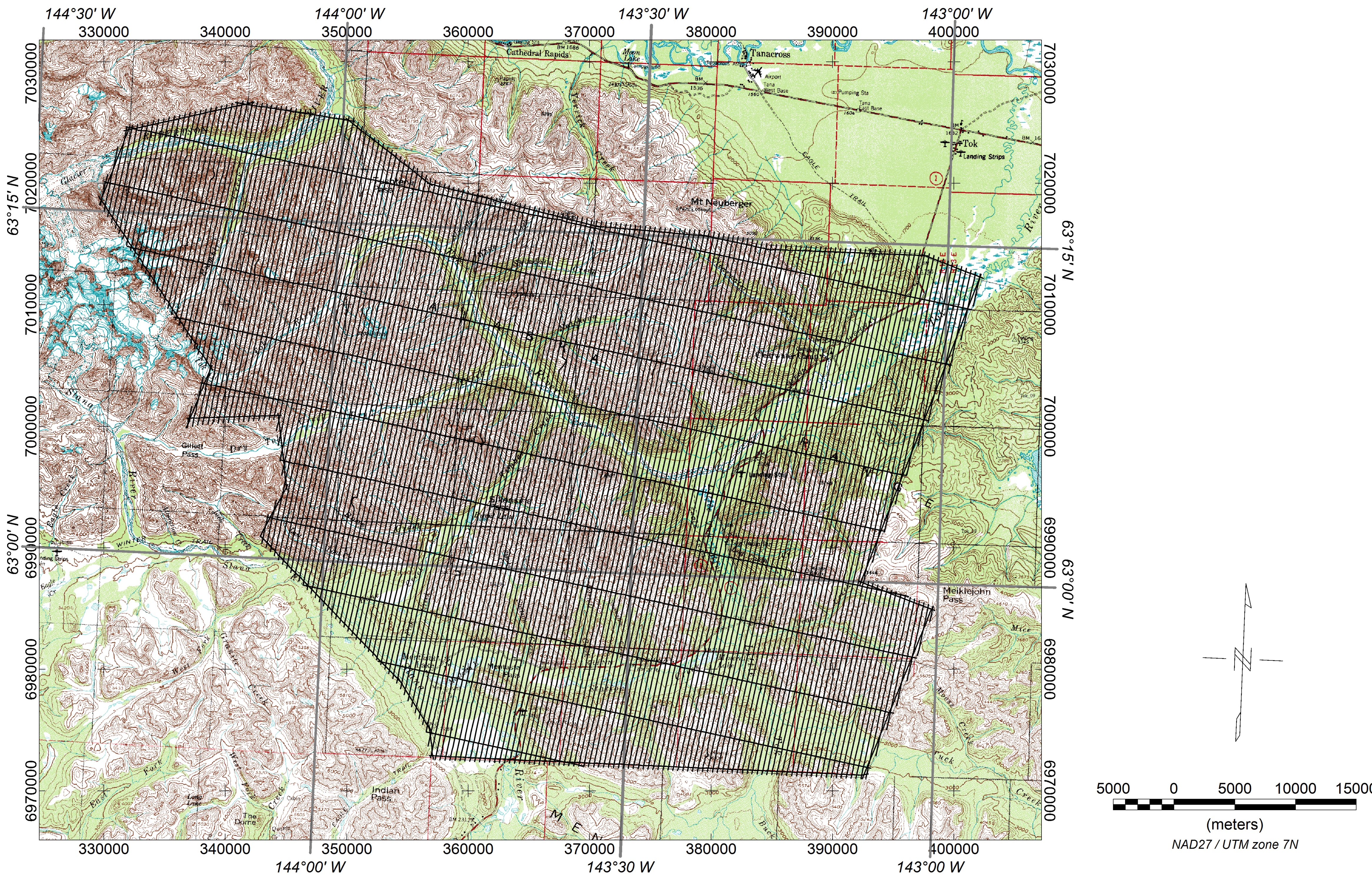
Flight Lines and Topography

Data Types: Frequency Domain Electromagnetic and Magnetic

System: DIGHEM^{V}

Frequencies: coaxial 1000 and 5500 Hz; coplanar 900 Hz, 7200 Hz and 56000 Hz

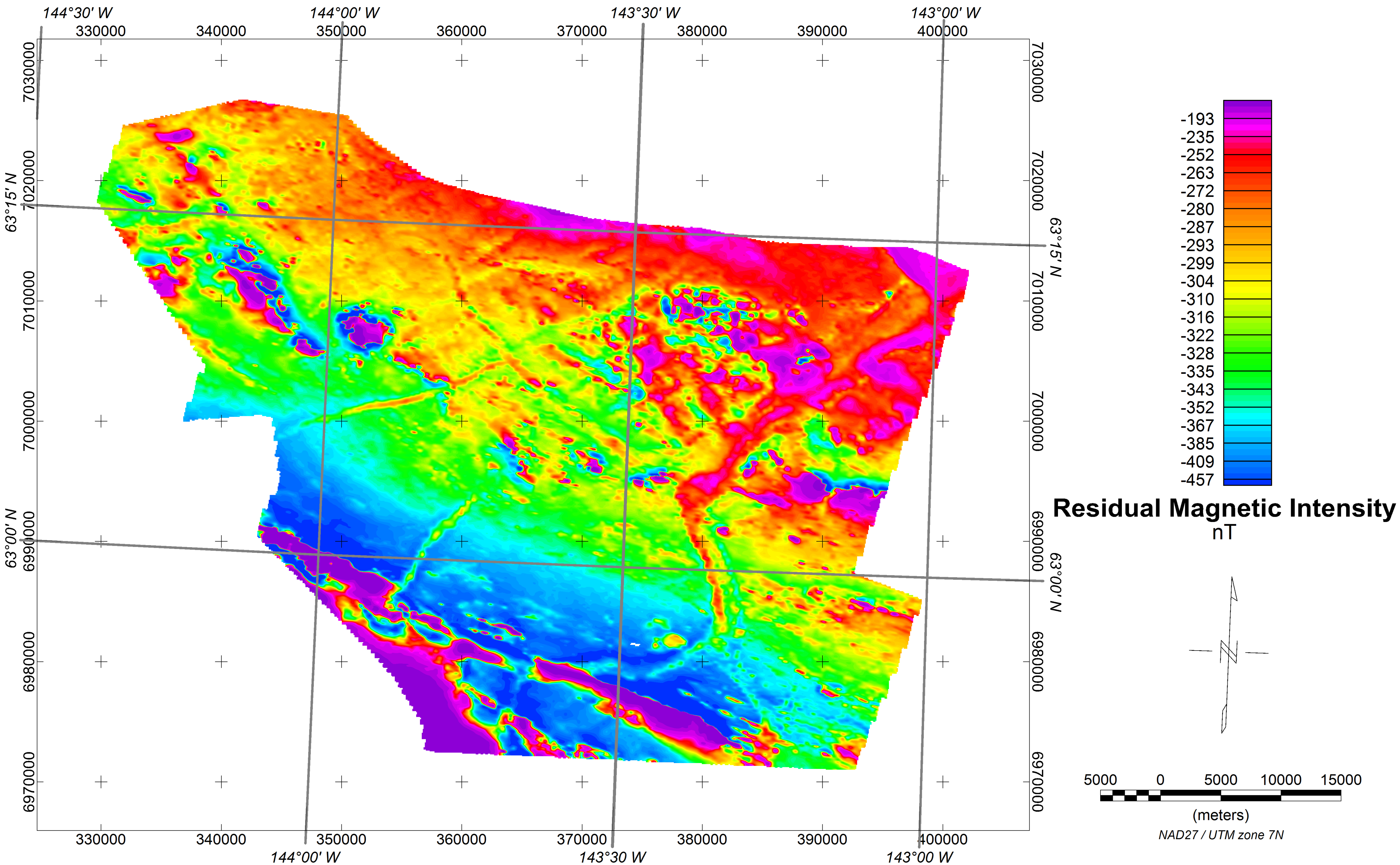
Line spacing: 400 meters



Residual Magnetic Field

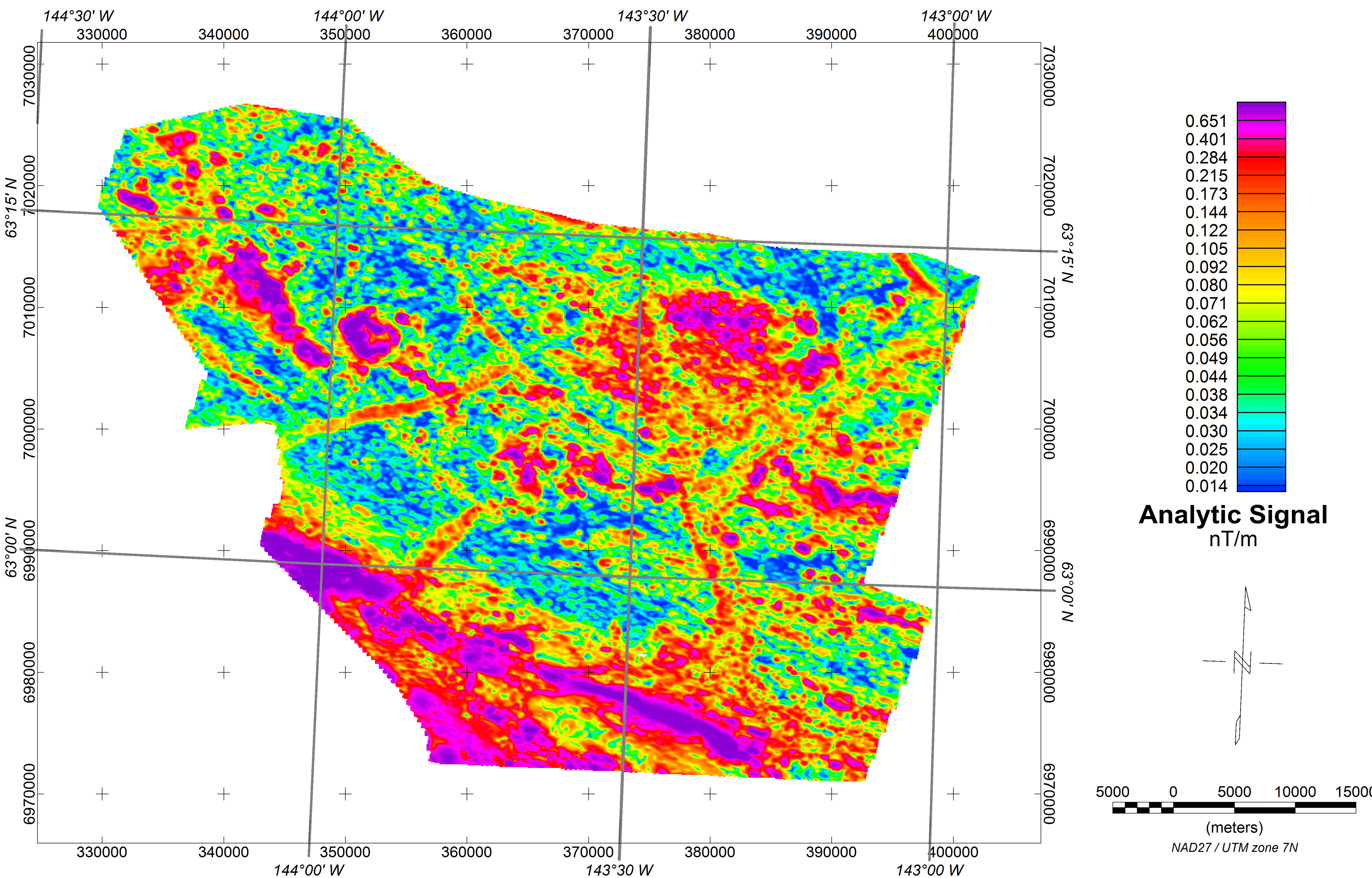
The magnetic total field data were processed using digitally recorded data from a CGG D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids in this publication.

Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.



Analytic Signal

Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (such as contacts, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and contacts, regardless of structural dip, and independent of the direction of the induced and/or remanent magnetizations.



First Vertical Derivative of the Magnetic Field

The magnetic total field data were processed using digitally recorded data from a CGG D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids in this publication. The first vertical derivative grid was calculated from the processed total magnetic field grid using an FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near-surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.

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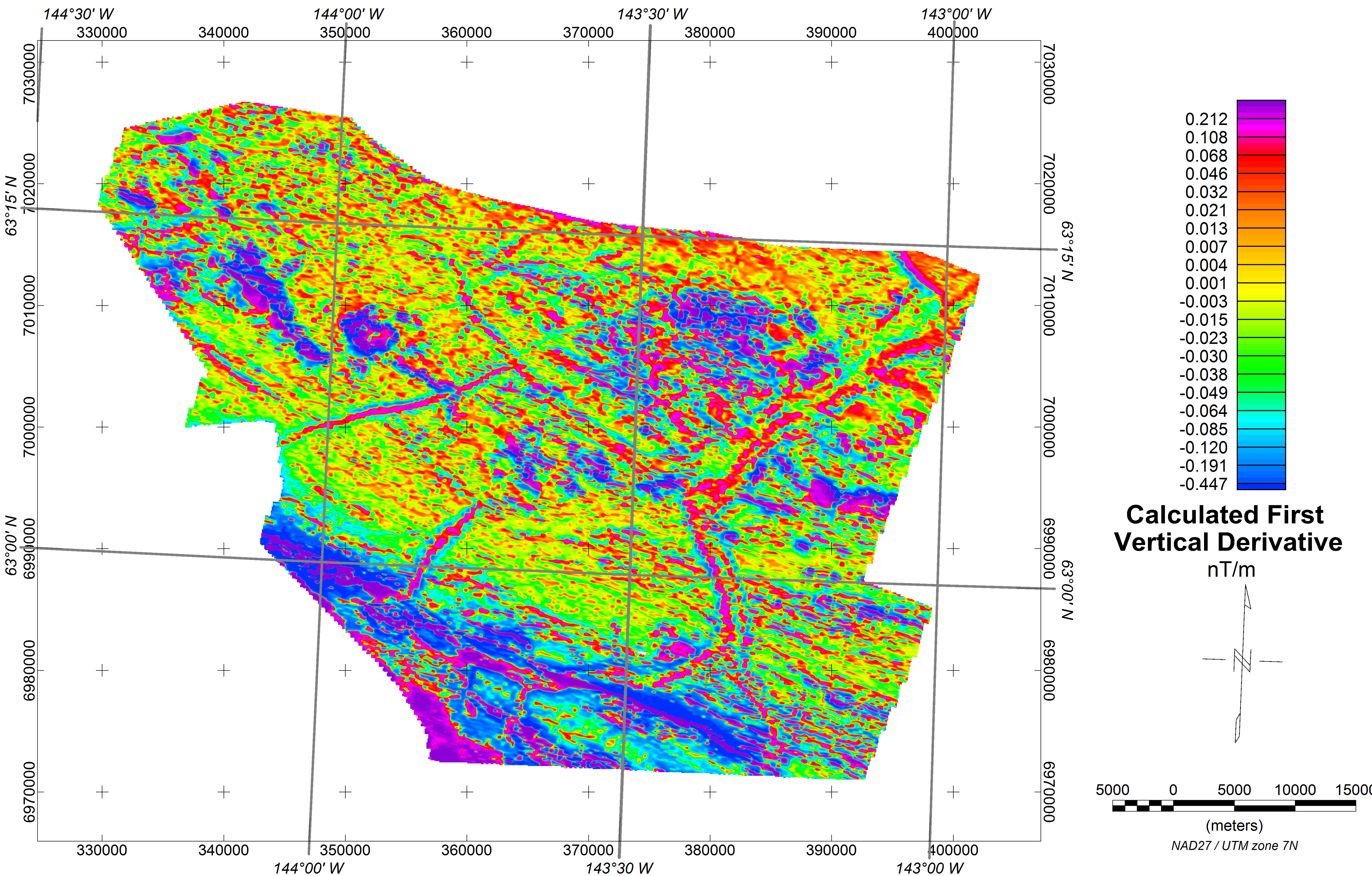
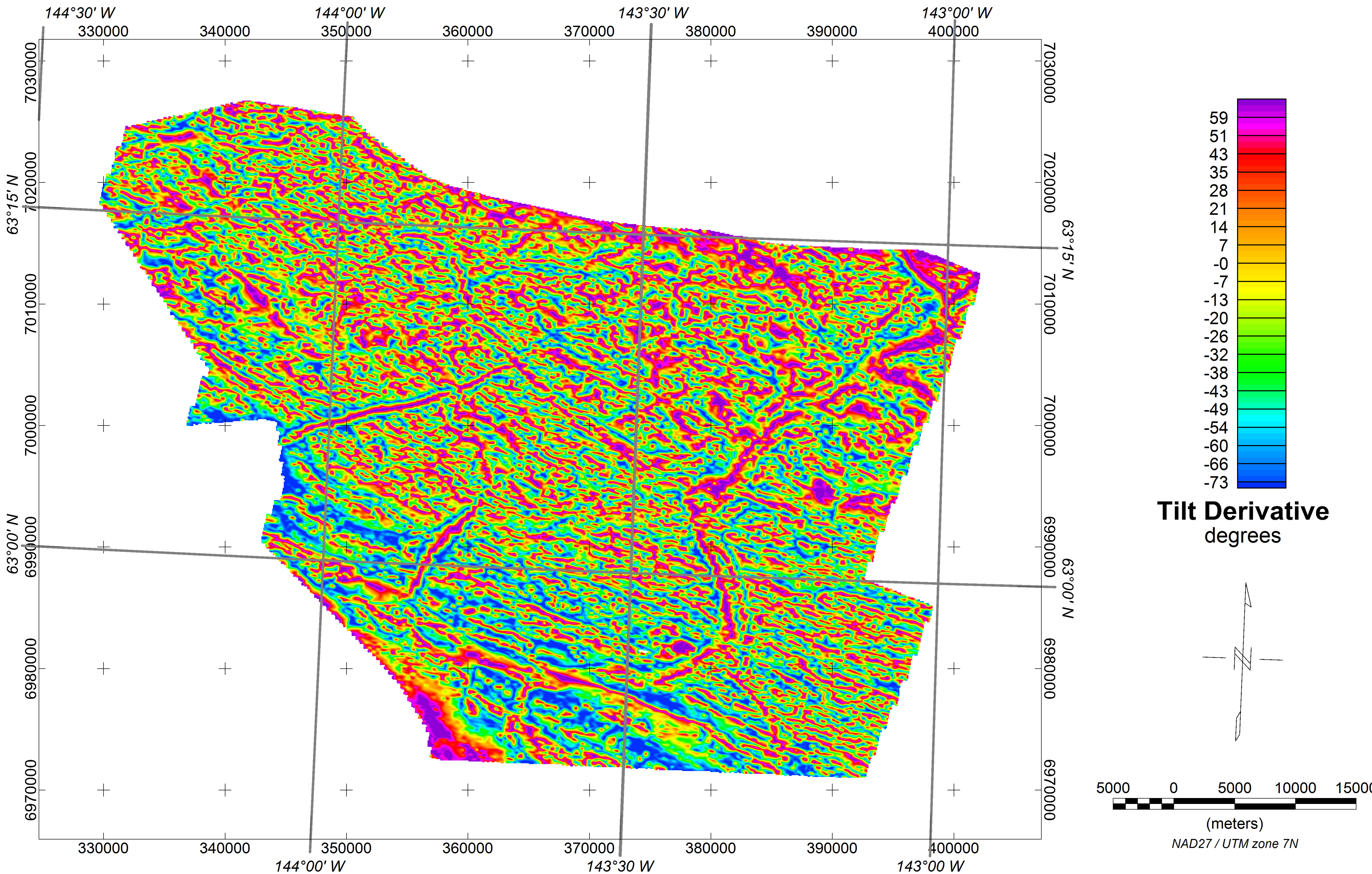


Magnetic Tilt Derivative

The tilt derivative is the angle between the horizontal gradient and the total gradient, which can be used to identify the depth and type of source. The tilt angle is positive over the source, crosses through zero at, or near, the edge of a vertical-sided source, and is negative outside the source region. The tilt derivative has the added advantage of responding equally well to shallow and deep sources and is able to resolve deeper sources that may be masked by larger responses from shallower sources.



Resistivity 56,000 Hz Coplanar

DIGHEM EM system measured in-phase and quadrature components at five frequencies. Two vertical coaxial coil pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the in-phase and quadrature component of the coplanar 56,000 Hz measurement using the pseudo-layer half-space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids in this publication.

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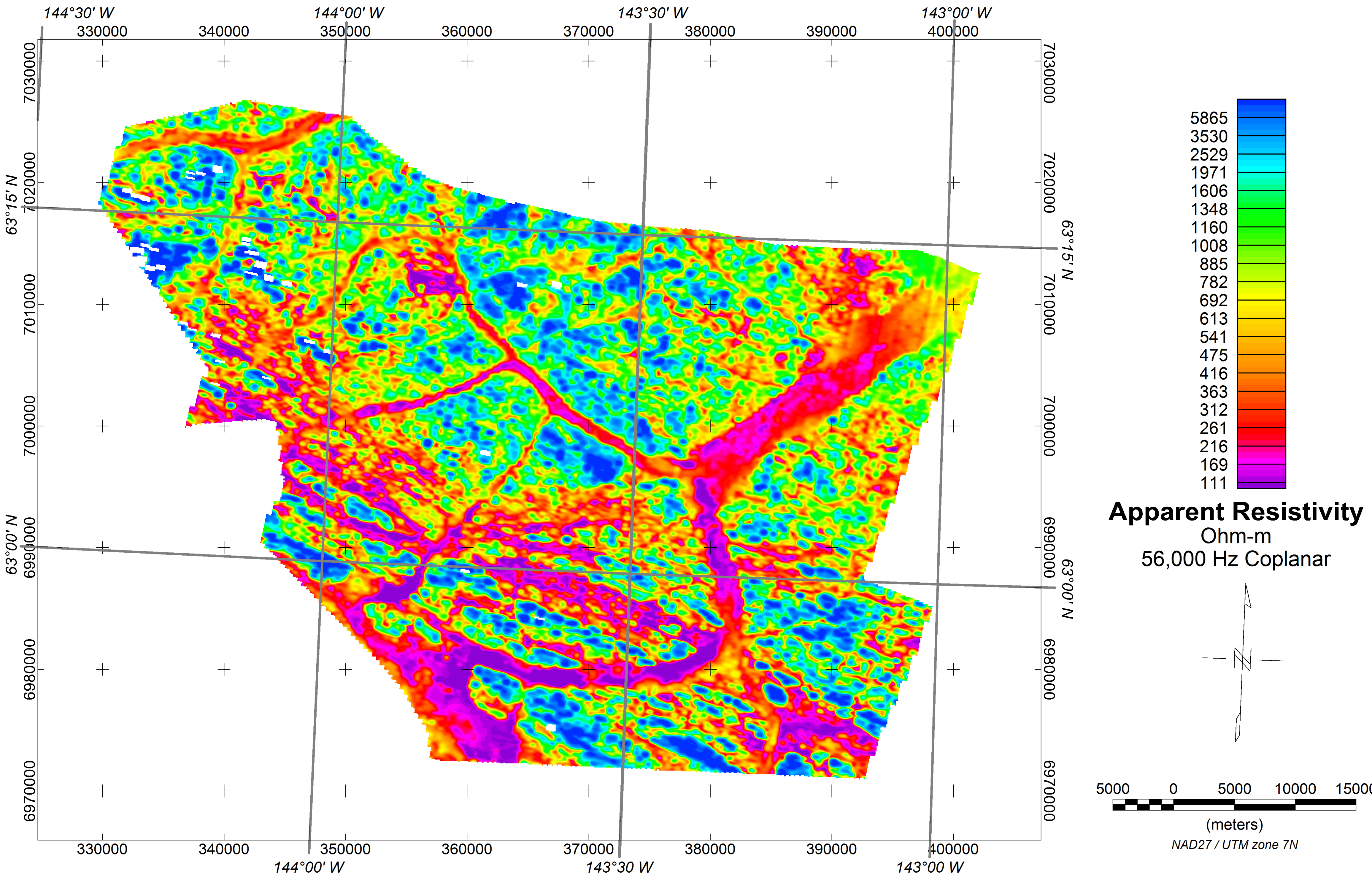

Resistivity 7,200 Hz Coplanar

DIGHEM EM system measured in-phase and quadrature components at five frequencies. Two vertical coaxial coil pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the in-phase and quadrature component of the coplanar 7,200 Hz measurement using the pseudo-layer half-space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids in this publication.

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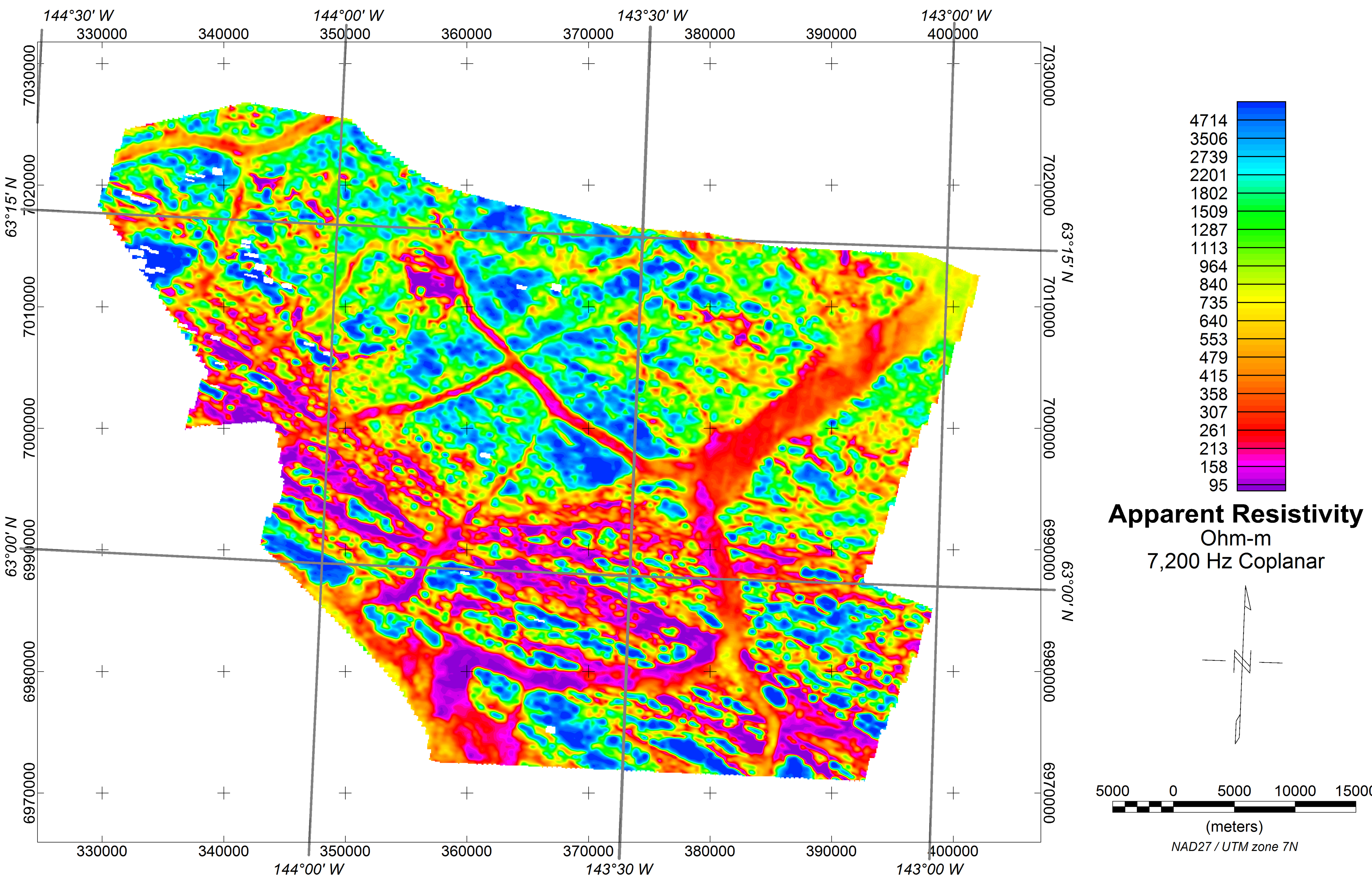

Resistivity 900 Hz Coplanar

DIGHEM EM system measured in-phase and quadrature components at five frequencies. Two vertical coaxial coil pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the in-phase and quadrature component of the coplanar 900 Hz measurement using the pseudo-layer half-space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids in this publication.

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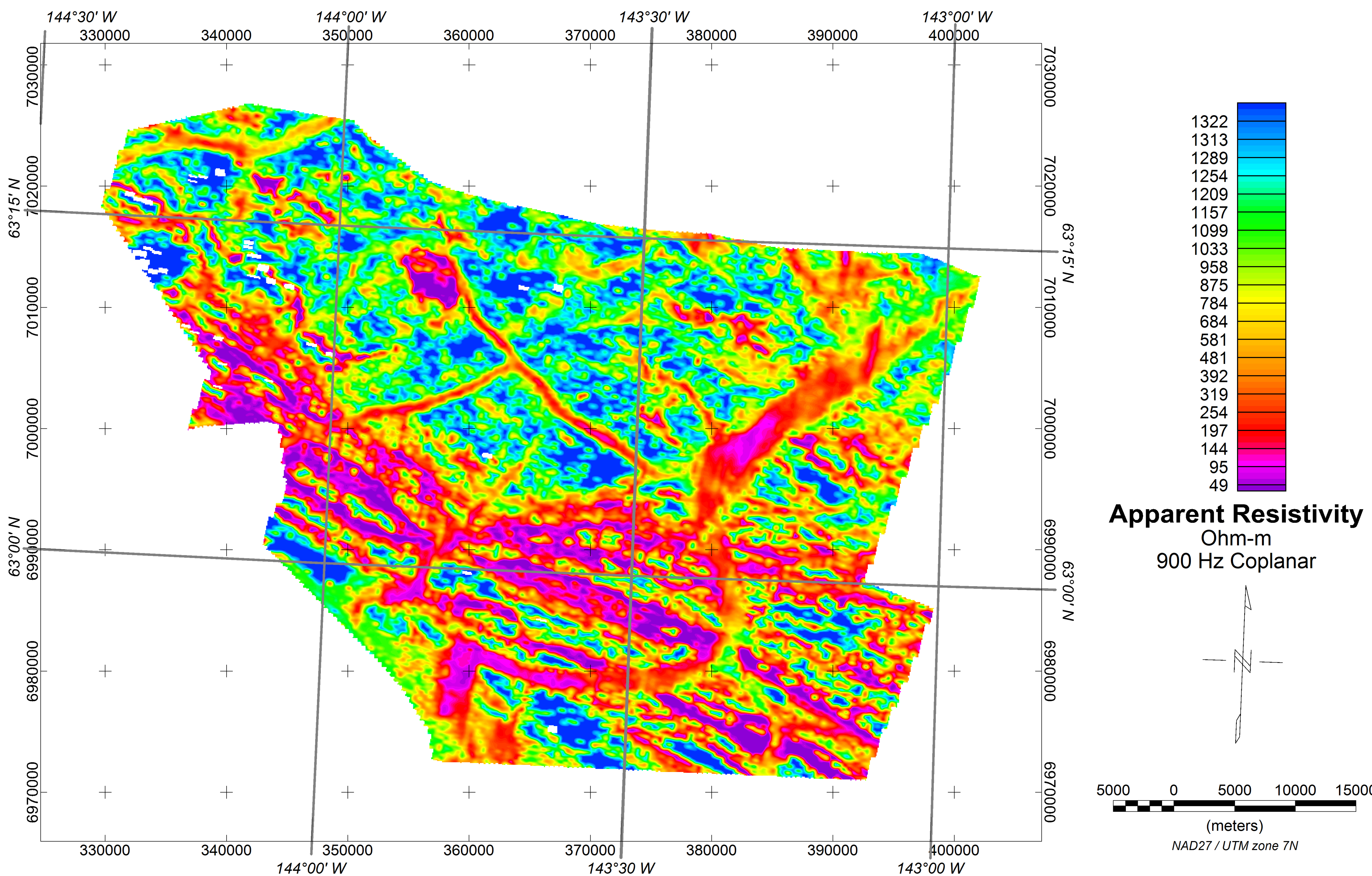
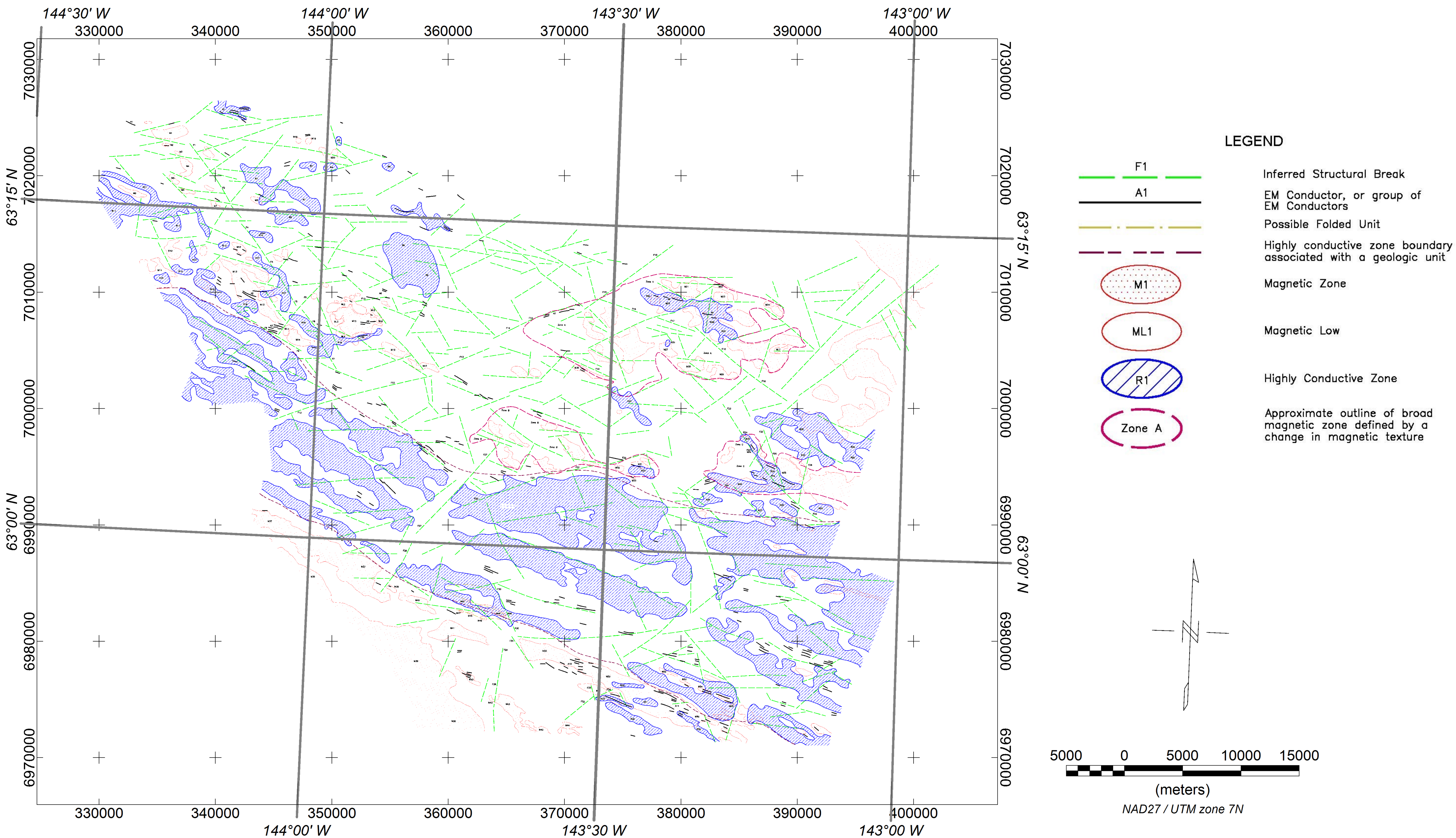


Electromagnetic and Magnetic Interpretation

Interpretation performed by CGG.   Features in the data were mapped and are available in a variety of formats. Discrete electromagnetic anomalies (not shown) were also picked and are available in multiple formats.



Stacked Multi-Channel Profiles

Magnetic, Electromagnetic, EM anomalies, and other data in profile are available in PDF format for all lines. Example shown below.